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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/809,605	03/24/2004	Ayman Fawzy Naguib	030227	7250

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Qualcomm Incorporated
Patents Department
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EXAMINER	
HAN, CLEMENCE S	
ART UNIT	**PAPER NUMBER**
2665	

DATE MAILED: 11/03/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/809,605	NAGUIB ET AL.	
	Examiner	Art Unit	
	Clemence Han	2665	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *14 March 2004*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-23* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-8,11-18 and 21-23* is/are rejected.

7)☒ Claim(s) *9,10 and 19-20* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Drawings

1. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: 520a in section [0030] on page 6 and 520b in section [0034] on page 7. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Claim Rejections - 35 USC § 112

2. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

3. Claim 11-14 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

4. Claim 11 recites the limitation "the signal to noise ratio" in line 7. There is insufficient antecedent basis for this limitation in the claim. (However, there is "a signal to noise level" in line 5 which could be a possible typographical error.)

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claim 1-4, 7, 8, 11, 12, 15 and 16 are rejected under 35 U.S.C. 102(b) as being anticipated by Larsson et al. (US Patent 5,956,642).

Regarding claim 1, Larsson teaches a method of scheduling sub-carriers in an Orthogonal Frequency Division Multiplexing (OFDM) system, the method comprising: determining a signal to noise ratio for allocated sub-carriers in an OFDM communication link (Column 4 Line 50-55); and adjusting a number of allocated sub-carriers based, at least in part, on the signal to noise ratio (Column 4 Line 56-63).

Regarding claim 2, Larsson teaches determining the signal to noise ratio comprising: determining a received power in a sub-carrier frequency band (Column 12 Line 20-22); determining a noise estimate in the sub-carrier frequency band during at least one time period in which a sub-carrier corresponding to the sub-carrier frequency band is unassigned (Column 10 Line 35-39); and determining a ratio of the received power in the sub-carrier frequency band to the noise estimate (Column 10 Line 48-51).

Regarding claim 3, Larsson teaches the noise estimate determined during at least one time period in which the sub-carrier is locally unassigned (Column 10 Line 35-39).

Regarding claim 4, Larsson teaches the noise estimate determined during at least one time period in which the sub-carrier is system-wide unassigned (Column 11 Line 17-18).

Regarding claim 7, Larsson teaches the signal to noise ratio comprising an average signal to noise ratio over all currently allocated sub-carrier frequency bands (Column 15 Line 28-30).

Regarding claim 8, Larsson teaches determining a total received power (Column 12 Line 21-22); determining a number of currently allocated sub-carriers (Column 11 Line 56-57); and wherein adjusting the number of allocated sub-

carriers is additionally based, at least in part, on the total received power and the number of currently allocated sub-carriers (Column 4 Line 56-63).

Regarding claim 11, Larsson teaches a method of scheduling sub-carriers in an Orthogonal Frequency Division Multiplexing (OFDM) system, the method comprising: receiving at a base station a wirelessly transmitted OFDM signal from a terminal (Column 10 Line 66 – Column 11 Line 3); determining a signal to noise level for allocated sub-carriers in the OFDM signal (Column 4 Line 50-55); determining if the signal to noise ratio is within a predetermined range (Column 13 Line 14-17); and scheduling a number of sub-carriers for a communication link from the terminal to the base station based, at least in part, on whether the signal to noise is within the predetermined range (Column 4 Line 56-63).

Regarding claim 12, Larsson teaches determining a total received power (Column 12 Line 21-22); determining a number of currently allocated sub-carriers (Column 11 Line 56-57); and wherein scheduling the number of sub-carriers is additionally based, at least in part, on the total received power and the number of currently allocated sub-carriers (Column 4 Line 56-63).

Regarding claim 15, Larsson teaches an apparatus for scheduling sub-carriers in an Orthogonal Frequency Division Multiplexing (OFDM) system, the apparatus comprising: a noise estimator 354 configured to estimate a noise level in

a sub-carrier frequency band; a signal to noise ratio determination module 378 coupled to the noise estimator and configured to determine a signal to noise ratio in the sub-carrier frequency band; and a sub-carrier scheduler 342 coupled to the signal to noise ratio determination module and configured to schedule a number of sub-carriers based, at least in part, on whether the signal to noise is within a predetermined range (Column 13 Line 14-17 and Column 4 Line 56-63).

Regarding claim 16, Larsson teaches the signal to noise ratio determination module further configured to determine a total received power (Column 12 Line 21-22), and wherein the sub-carrier scheduler is further configured to schedule the number of sub-carriers based, at least in part, on the total received power (Column 4 Line 56-63).

7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.

8. Claim 21-23 are rejected under 35 U.S.C. 102(a) as being anticipated by Yoshida et al. (US Pub. 2002/0089923).

Regarding claim 21, Yoshida teaches A method of scheduling sub-carriers in an Orthogonal Frequency Division Multiplexing (OFDM) system, the method

comprising: receiving a sub-carrier allocation [0053]; modifying a coding rate for data provided to an allocated sub-carrier based, at least in part, on a number of sub-carriers in the sub-carrier allocation [0008]; and generating an OFDM signal using the number of sub-carriers in the sub-carrier allocation [0005] (See Figure 1).

Regarding claim 22, Yoshida teaches modifying the coding rate comprises decreasing the coding rate from a current coding rate if the number of allocated sub-carriers is greater than a previous number of allocated sub-carriers [0008] (See line 7 and 13-15).

Regarding claim 23, Yoshida teaches modifying the coding rate comprises increasing the coding rate from a current coding rate if the number of allocated sub-carriers is less than a previous number of allocated sub-carriers [0008] (See line 7 and 13-15).

Claim Rejections - 35 USC § 103

9. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

10. Claim 5 and 17 are rejected under 35 U.S.C. 103(a) as being unpatentable over Larsson et al. in view of Wright (US Patent 6,570,444).

Regarding claim 5, Larsson teaches a method of scheduling sub-carriers in an Orthogonal Frequency Division Multiplexing (OFDM) system, the method comprising: determining a signal to noise ratio for allocated sub-carriers in an OFDM communication link (Column 4 Line 50-55); and adjusting a number of allocated sub-carriers based, at least in part, on the signal to noise ratio (Column 4 Line 56-63). Larsson, however, does not teach the signal to noise ratio comprising a signal to noise floor ratio. Wright teaches the signal to noise ratio comprising a signal to noise floor ratio (Column 1 Line 15). It would have been obvious to one skilled in the art to modify Larsson to use signal to noise floor ratio as taught by Wright in order to determine the minimum signal to noise ratio (Column 6 Line 13-16).

Regarding claim 17, Larsson teaches an apparatus for scheduling sub-carriers in an Orthogonal Frequency Division Multiplexing (OFDM) system, the apparatus comprising: a noise estimator 354 configured to estimate a noise level in a sub-carrier frequency band; a signal to noise ratio determination module 378 coupled to the noise estimator and configured to determine a signal to noise ratio in the sub-carrier frequency band; and a sub-carrier scheduler 342 coupled to the signal to noise ratio determination module and configured to schedule a number of sub-carriers based, at least in part, on whether the signal to noise is within a

predetermined range (Column 13 Line 14-17 and Column 4 Line 56-63). Larsson, however, does not teach the signal to noise ratio comprising a signal to noise floor ratio. Wright teaches the signal to noise ratio comprising a signal to noise floor ratio (Column 1 Line 15). It would have been obvious to one skilled in the art to modify Larsson to use signal to noise floor ratio as taught by Wright in order to determine the minimum signal to noise ratio (Column 6 Line 13-16).

11. Claim 6 and 18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Larsson et al. in view of Magee et al. (US Patent 6,563,885).

Regarding claim 6, Larsson teaches a method of scheduling sub-carriers in an Orthogonal Frequency Division Multiplexing (OFDM) system, the method comprising: determining a signal to noise ratio for allocated sub-carriers in an OFDM communication link (Column 4 Line 50-55); and adjusting a number of allocated sub-carriers based, at least in part, on the signal to noise ratio (Column 4 Line 56-63). Larsson, however, does not teach the signal to noise ratio comprising a signal to interference plus noise ratio. Magee teaches the signal to noise ratio comprising a signal to interference plus noise ratio (Column 1 Line 66-67). It would have been obvious to one skilled in the art to modify Larsson to use signal to interference plus noise ration as taught by Magee in order to compensate the noise (Column 1 Line 59-63).

Regarding claim 18, Larsson teaches an apparatus for scheduling sub-carriers in an Orthogonal Frequency Division Multiplexing (OFDM) system, the apparatus comprising: a noise estimator 354 configured to estimate a noise level in a sub-carrier frequency band; a signal to noise ratio determination module 378 coupled to the noise estimator and configured to determine a signal to noise ratio in the sub-carrier frequency band; and a sub-carrier scheduler 342 coupled to the signal to noise ratio determination module and configured to schedule a number of sub-carriers based, at least in part, on whether the signal to noise is within a predetermined range (Column 13 Line 14-17 and Column 4 Line 56-63). Larsson, however, does not teach the signal to noise ratio comprising a signal to interference plus noise ratio. Magee teaches the signal to noise ratio comprising a signal to interference plus noise ratio (Column 1 Line 66-67). It would have been obvious to one skilled in the art to modify Larsson to use signal to interference plus noise ration as taught by Magee in order to compensate the noise (Column 1 Line 59-63).

Allowable Subject Matter

12. Claim 9, 10, 19 and 20 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

13. Claim 13 and 14 would be allowable if rewritten to overcome the rejection(s) under 35 U.S.C. 112, 2nd paragraph, set forth in this Office action and to include all of the limitations of the base claim and any intervening claims.

Conclusion

14. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. The following patents are cited to further show the state of the art with respect to the OFDM in general.

U.S. Pub. 2004/0208139 to Iwamura

U.S. Patent 6,052,594 to Chuang et al.

U.S. Patent 5,726,978 to Frodigh et al.

U.S. Patent 6,131,016 to Greenstein et al.

U.S. Patent 6,751,444 to Meiyappan

U.S. Patent 6,064,692 to Chow

U.S. Patent 5,991,273 to Abu-Dayya

U.S. Patent 5,973,642 to Li et al.

U.S. Patent 6,005,876 to Cimini et al.

Japan Patent 2003060609 A to Usui

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Clemence Han whose telephone number is

(571) 272-3158. The examiner can normally be reached on Monday-Thursday 7 - 5.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Huy Vu can be reached on (571) 272-3155. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

C.H.

Clemence Han
Examiner
Art Unit 2665

ALPUS H. HSU
PRIMARY EXAMINER